

WHAT IS CLAIMED IS:

1. An apparatus comprising a latch circuit which includes:

5 first and second resonant tunneling devices coupled in series with each other between first and second nodes; and

a reset portion coupled to said first and second nodes, said reset portion including a photodiode portion
10 which is responsive to varying photonic energy for switching between first and second states which are different, wherein when said photodiode portion is in said first state said reset portion normalizes a voltage across each of said resonant tunneling devices.

15 2. An apparatus according to Claim 1, wherein said first and second resonant tunneling devices are resonant tunneling diodes which are substantially identical to each other.

20 3. An apparatus according to Claim 2, including:
a latch input terminal coupled to a third node disposed between said first and first and second resonant tunneling diodes; and

25 a latch output terminal coupled to said third node.

4. An apparatus according to Claim 3, including a resistive element, said input terminal being coupled to said third node through said resistive element.

5. An apparatus according to Claim 2, including:
a first bias terminal to which is applied a first
bias voltage;

5 a second bias terminal to which is applied a second
bias voltage different from said first bias voltage;

a first resistive element coupled between said first
bias terminal and said first node; and

10 a second resistive element coupled between said
second bias terminal and said second node.

6. An apparatus according to Claim 5,
wherein said first and second resistive elements
have substantially the same resistive characteristic; and

15 wherein one of said first and second bias voltages
is a positive voltage, and the other thereof is a
negative voltage substantially equal and opposite in
magnitude to said positive voltage.

20 7. An apparatus according to Claim 2, wherein said
photodiode portion includes a photodiode coupled between
said first and second nodes, said photodiode being
conductive in said first state of said photodiode
portion, and being substantially nonconductive in said
25 second state of said photodiode portion.

8. An apparatus according to Claim 7,
including a first terminal to which is applied a
first voltage, and a second terminal to which is applied
5 a second voltage less than said first voltage; and

wherein said reset portion includes a first
resistive element coupled between said first terminal and
a first end of said photodiode, a first capacitive
element coupled between said first node and said first
10 end of said photodiode, a second resistive element
coupled between said second terminal and a second end of
said photodiode, and a second capacitive element coupled
between said second node and said second end of said
photodiode.

15 9. An apparatus according to Claim 2, wherein said
photodiode portion includes first and second photodiodes
which are each coupled to a respective one of said first
and second nodes, each of said photodiodes being
20 conductive in said first state of said photodiode
portion, and being substantially nonconductive in said
second state of said photodiode portion.

10. An apparatus according to Claim 9,

including a first terminal to which is applied a first voltage, and a second terminal to which is applied a second voltage less than said first voltage, said first and second photodiodes each having a first end which is coupled to a respective one of said first and second terminals, and having a second end; and

wherein said reset portion includes a first resistive element having one end coupled to said second end of said first photodiode and having a further end coupled to a third voltage which is between said first and second voltages, a second resistive element having one end coupled to said second end of said second photodiode and having a further end coupled to the third voltage, a first capacitive element coupled between said first node and said second end of said first photodiode, and a second capacitive element coupled between said second node and said second end of said second photodiode.

11. A method of operating a latch circuit having first and second resonant tunneling devices coupled in series with each other between first and second nodes, and a reset portion coupled to said first and second nodes, including:

configuring said reset portion to include a photodiode portion which is responsive to varying photonic energy for switching between first and second states that are different; and

causing said photodiode portion to normalize a voltage across each of said resonant tunneling devices when said reset portion is in said first state.

12. A method according to Claim 11, including selecting first and second resonant tunneling diodes which are substantially identical to each other to serve as said first and second resonant tunneling devices.

13. A method according to Claim 12, including configuring said photodiode portion to include a photodiode coupled between said first and second nodes, said photodiode being conductive in said first state of said photodiode portion, and being substantially nonconductive in said second state of said photodiode portion.

14. A method according to Claim 12, including
configuring said photodiode portion to include first and
second photodiodes which are each coupled to a respective
5 one of said first and second nodes, each of said
photodiodes being conductive in said first state of said
photodiode portion, and being substantially nonconductive
in said second state of said photodiode portion.